Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A system comprising control logic and a programming interface, the programming interface including a user instruction ~~being~~ configured to permit a user to specify one or more ~~a plurality of~~ weighting points for a transitioning path segment in a multi-dimensional coordinate space, the weighting points and the transitioning path segment extending between first and second additional path segments in the multi-dimensional coordinate space, the control logic being configured to generate the transitioning path segment based on the weighting points, and the control logic including spline computation logic configured to generate a spline curve forming the transitioning path segment, the spline computation logic being configured to generate the spline curve based on boundary conditions relating to the first and second additional path segments and based on a series of control points extending from the first path segment to the second path segment, wherein the spline computation logic is configured to generate the control points based on the weighting points and based on the boundary conditions, wherein the spline curve extends near the weighting points and passes through at least some of the series of control points, and wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by ~~the spline curve~~ the first additional path segment, the transitioning path segment, and the second additional path segment.

2. (Original) A system according to claim 1, wherein the spline curve is a Bézier spline curve.

3. (Original) A system according to claim 1, wherein the spline curve does not pass through the weighting points.

4. (Original) A system according to claim 1,
wherein the spline curve comprises a plurality of spline curve segments;

wherein the control logic determines a starting velocity vector, a starting acceleration vector, an ending velocity vector, and an ending acceleration vector for each of the spline curve segments;

wherein the ending velocity vector and the ending acceleration vector for each of the plurality of spline curve segments are determined so as to be approximately equal to the starting velocity vector and the starting acceleration vector for a next adjacent one of the plurality of spline curve segments.

5. (Original) A system according to claim 1, wherein the control signals include position reference values, and wherein the control logic includes an interpolator configured to generate the position reference values substantially simultaneously along a plurality of different motion axes.

6. (Original) A system according to claim 5, wherein the interpolator generates the position reference values based on a plurality of coefficient vectors, the coefficient vectors being coefficients of the spline curve and being determined based on the boundary conditions and the weighting points.

7. (Currently Amended) A system according to claim 1, wherein ~~the path defined by the spline curve connects first and second additional path segments,~~ the first and second additional path segments are ~~being~~ non-tangential.

8. (Currently Amended) A system according to claim 7, wherein the first and second ~~additional~~ path segments are linear path segments.

9. (Original) A system according to claim 7, wherein one of the first and second additional path segments is a linear path segment and the other one of the first and second additional path segments is a curved path segment.

10. (Original) A system according to claim 7, wherein the first and second additional path segments are curved path segments.

11. (Original) A system according to claim 7, wherein the merging point is derived from the first and second path segment.

12. (Currently Amended) A system according to claim 7, wherein the spline curve is generated without using characteristics of the first and second additional path segments other than velocity and acceleration vectors for the first and second path segments at the boundary points.

13. (Original) A system according to claim 1, wherein the programming interface is an object-oriented programming interface in which displayable objects are used to represent physical hardware and relationships between physical hardware.

14. (Currently Amended) ~~A system according to claim 1,~~

A system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify one or more weighting points in a multi-dimensional coordinate space, and the control logic including spline computation logic configured to generate a spline curve based on boundary conditions, wherein the spline curve extends near the weighting points, and wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the spline curve;

wherein the programming interface includes a jog block which permits the user via a jog instruction to specify a new motion axis velocity, a move block which permits the user via a move instruction to specify a new motion axis position, a time cam block which permits a user via a time cam instruction to specify a motion axis position profile which specifies motion axis position as a function of time, a gear block which permits the user via a gear instruction to specify an electronic gearing relationship between the position of one motion axis and the position of another motion axis, a position cam block which permits the user via a position cam instruction to specify a motion axis position profile which specifies the position of one axis as a function of the position of another motion axis.

15. (Original) A system according to claim 1, wherein the system is an industrial control system.

16. (Currently Amended) A control method for controlling movement of a controlled element in a multi-dimensional coordinate system, comprising:

receiving one or more ~~a plurality of~~ weighting points for a transitioning path segment by way of a user instruction, the transitioning path segment extending between first and second additional path segments;

generating a plurality of control points for a plurality of adjacent spline segments based on boundary conditions and the ~~plurality of~~ weighting points, the plurality of adjacent spline segments forming the transitioning path segment;

generating a plurality of coefficient vectors for the plurality of spline segments based on the plurality of control points;

generating a first plurality of position reference values based on the plurality of coefficient vectors and using the first plurality of position reference values to control a first motion axis, the first motion axis operating in a first dimension of the multi-dimensional coordinate system; and

generating a second plurality of position reference values based on the plurality of coefficient vectors and using the second plurality of position reference values to control a second motion axis, the second motion axis operating in a second dimension of the multi-dimensional coordinate system.

17. (Currently Amended) A method according to claim 16, wherein, during movement along the transitioning [[transition]] path segment, the controlled element transitions from the first additional path segment, to the transitioning path segment, and then to the second additional path segment ~~a previous path segment, to the spline path, and then to a next path segment~~ without discontinuities in velocity and acceleration.

18. (Original) A method according to claim 16, wherein the plurality of adjacent spline segments form a Bézier spline curve.

19. (Original) A method according to claim 16, wherein the plurality of spline segments do not pass through the weighting points.

20. (Currently Amended) A method according to claim 16,

wherein each of the plurality of spline curve segments have a starting velocity vector, a starting acceleration vector, an ending velocity vector, and an ending acceleration vector;

wherein the method further comprises determining the ending velocity vector and the ending acceleration vector for each of the plurality of spline curve segments [[are determined]] so as to be approximately equal to the starting velocity vector and the starting acceleration vector for a next adjacent one of the plurality of spline curve segments.

21. (Original) A method according to claim 16, wherein the user instruction is provided as part of a programming interface, and wherein the programming interface is an object-oriented programming interface in which displayable objects are used to represent physical hardware and relationships between physical hardware.

22. (Currently Amended) ~~A method according to claim 16,~~

A control method for controlling movement of a controlled element in a multi-dimensional coordinate system, comprising:

receiving one or more weighting points by way of a user instruction;

generating a plurality of control points for a plurality of adjacent spline segments based on boundary conditions and the plurality of weighting points;

generating a plurality of coefficient vectors for the plurality of spline segments based on the plurality of control points;

generating a first plurality of position reference values based on the plurality of coefficient vectors and using the first plurality of position reference values to control a first motion axis, the first motion axis operating in a first dimension of the multi-dimensional coordinate system; and

generating a second plurality of position reference values based on the plurality of coefficient vectors and using the second plurality of position reference values to control a second motion axis, the second motion axis operating in a second dimension of the multi-dimensional coordinate system;

wherein the user instruction is provided as part of a programming interface, and wherein the programming interface includes a jog block which permits the user via a jog

instruction to specify a new motion axis velocity, a move block which permits the user via a move instruction to specify a new motion axis position, a time cam block which permits a user via a time cam instruction to specify a motion axis position profile which specifies motion axis position as a function of time, a gear block which permits the user via a gear instruction to specify an electronic gearing relationship between the position of one motion axis and the position of another motion axis, a position cam block which permits the user via a position cam instruction to specify a motion axis position profile which specifies the position of one motion axis as a function of the position of another motion axis.

23. (Currently Amended) A system for controlling a first motion axis and a second motion axis; the system comprising motion control logic configured to control the first motion axis and the second motion axis in accordance with a user program, wherein the motion control logic provides a plurality of instructions configured for use in the user program, the plurality of instructions including an instruction that permits a move to be specified by specifying one or more weighting points for a transitioning path segment formed of a spline curve ~~path~~ to be followed by the controlled element in a multi-dimensional coordinate system that includes the first motion axis and the second motion axis, the transitioning path segment connecting first and second additional path segments in the multi-dimensional coordinate system, wherein the instruction permits the move to be specified by specifying the weighting points for the spline curve without having to specify control points for the spline curve, the control points for the spline curve being generated by the motion control logic based on the weighting points, and wherein the spline curve passes through at least some of the control points and not the weighting points.

24. (Currently Amended) An industrial control system comprising:

a plurality of input devices;

a plurality of output devices;

a communication network;

a plurality of motion axes;

a plurality of microprocessor-based controllers, the plurality of controllers being coupled to each other by way of the communication network, the plurality of controllers being

coupled to respective ones of the plurality of input devices and the plurality of output devices, the plurality of controllers being configured to control the plurality of output devices based on input status information from the plurality of input devices, the plurality of microprocessor-based controllers including control logic configured to control the plurality of motion axes, and the plurality of controllers being configured to be programmed with a user program; and

a programming interface, the programming interface being configured to permit a user to generate the user program, the user program including a user instruction which permits the user to specify one or more ~~a plurality of~~ weighting points for a transitioning path segment in a multi-dimensional coordinate space, the transitioning path segment extending between first and second additional path segments; and

wherein the control logic includes spline computation logic configured to generate a spline curve which extends near the weighting points, the spline curve forming the transitioning path segment, the spline computation logic being configured to generate control points based on the weighting points, the spline curve being generated based on the control points, and the spline computation logic being ~~and is~~ configured to generate control signals to control operation of the plurality of motion axes to drive movement of a controlled element along a path defined by the spline curve.

25. (New) A system according to claim 1, wherein the spline curve comprises a plurality of spline path segments, and wherein the spline computation logic is configured to generate the series of control points such that the first and second derivatives of the spline path segments are equal at transition points for adjacent spline path segments.

26. (New) A method according to claim 16, wherein the control points are generated such that the first and second derivatives of the plurality of adjacent spline segments are equal at transition points for adjacent spline path segments.

27. (New) A system according to claim 23, wherein the spline curve comprises a plurality of spline path segments, and wherein the motion control logic is configured to generate the series of control points such that the first and second derivatives of the spline path segments are equal at transition points for adjacent spline path segments.

28. (New) A system according to claim 24, wherein the spline curve comprises a plurality of spline path segments, and wherein the spline computation logic is configured to generate the series of control points such that the first and second derivatives of the spline path segments are equal at transition points for adjacent spline path segments.